# STATEMENT OF REQUIREMENT Automated Shelving Unit System

### Scope.

This Statement of Work shall provide both general and technical information for the procurement of an Automated Shelving System. This system will be used by the Sheet Metal Shop (Cost Work Center 742) and Welding Shop (Cost Work Center 743) at the Marine Corps' west coast repair depot, Maintenance Center Barstow (MCB), California. The Automated Shelving System must meet both the physical and performance specifications as outlined in this statement of work. It must also comply with all Department of Defense (DoD) standards and specifications as well as other government documents and associated industry requirements listed in this SOW. After contract award the contractor will package, ship, install, verify equipment operation, and train government employees how to operate and perform factory recommended preventive maintenance procedures.

#### Tasks.

Contractor will provide a quantity of 1 ea. Automated Shelving Unit System. This system shall consist of Sheet Metal Storage Retrieval component and Bar Stock Storage Retrieval component. Below are physical characteristics and performance specifications:

## 1. General Requirements.

- 1.1. Standard painting & coating
  - 1.1.1. In accordance with Commercial standards
- 1.2. Operating Gantry Crane: For safe operation and fast movement of metals.
  - 1.2.1. Lifting gear drive shall be three-phase gear motor, mechanical coupling and special projecting precision roller chains for smooth run on the lifting traverse
  - 1.2.2. Height positioning shall be by positioning control with absolute value encoder
  - 1.2.3. Overload protection shall be ensured through current input control on the lifting gear
  - 1.2.4. Shall be frequency controlled
- 1.3. Pull and push device: For a reliable pallet /cassette transport.
  - 1.3.1. Shall be extendable on one side and on both sides for the double tower
  - 1.3.2. Positioning control shall be equipped with absolute value encoder
  - 1.3.3. Shall have end switches to check that the pallet/cassette positioning is correct, ensuring the pallets /cassettes are transported safely and reliably
  - 1.3.4. Shall be frequency controlled
  - 1.3.5. Single tower shall have direct material access for storing and removing in the lowest starting position of the operating gantry crane
  - 1.3.6. Double tower shall have direct material access in the storing and removing station
  - 1.3.7. Proportionate safety equipment shall be contained under this position
- 1.4. <u>Shelf Block</u>: Welded steel structure for storing pallets of sheet metal and cassettes of bar stock
  - 1.4.1. Shelf compartments shall be equipped with low wear plastic gliders to move the pallets /cassettes in and out of the shelf block
  - 1.4.2. Calculation shall be in line with the static and dynamic aspects
  - 1.4.3. Shelf compartments shall be designed for maximum loading capacity
  - 1.4.4. Entire steel structure shall be designed for 90% field load

- 1.5. <u>Protective Fence</u>: Shall be approximately 72.16ft. (22m) x 7.22ft. (2.2m) for shelf system with openings for stations
- 1.6. Optical Contour Check: Monitors loading height. 6 units required.
  - 1.6.1. Shall be capable of detecting pallets/cassettes with accidentally protruding material in height, and alerting artisan to make corrections

# 1.7. <u>Electrical Equipment</u>:

- 1.7.1. Control cabinet and terminal boxes shall be completely wired
- 1.7.2. Contractor shall provide one each Station control console
- 1.7.3. Operation shall have elements for manual functions, for switching the operation mode (manual/automatic), for restoring, for light barrier release (only for automatic stations) and emergency-off
- 1.7.4. Shall have push-button control (dead man's feature)
- 1.7.5. Station shall be visible from the control console
- 1.7.6. Travel drive shall be stepless, frequency-controlled 0-98.40 ft/min (0-30m/min)
- 1.8. <u>Automatic Approach and Exit</u>: Monitors automatic approach and exit of the pallet /cassette.
  - 1.8.1. Proportionate safety equipment shall be included under this position
- 1.9. Control for Automatic Operation with ID Number Management:
  - 1.9.1. Manual and automatic control as well as order management, for the entire storage system. Shall include ability to adjust work and initial operation without inserting pallets/cassettes. Storage control computer shall have all software required to operate. Shall also consist of the following:

#### 1.9.1.1. Hardware:

- 1.9.1.1.1. Control cabinet with main switch
- 1.9.1.1.2. High voltage power unit for controlling all the positioning elements
- 1.9.1.1.3. Control voltage 24 V DC
- 1.9.1.1.4. Freely programmable control system (programming language Siemens STEP 7)
- 1.9.1.1.5. Service socket 230 V, control cabinet lighting

### 1.9.1.2. **Operation**:

- 1.9.1.2.1. Shall have capability for automatic addition or removal of pallets/cassettes according to the order pre-selection
- 1.9.1.2.2. All motion operations shall be capable of switching from automatic to manual operation of setting up and service operation
- 1.9.1.2.3. Shall have entrance aid for determining the middle of the passageway
- 1.9.1.2.4. Shall have driving cycle through control display and STOP push-button
- 1.9.1.2.5. Shall have order entry through 10" touch TFT color display at the operating terminal
- 1.9.1.2.6. Shall have user-friendly menu selection
- 1.9.1.2.7. Shall have visualization through display
- 1.9.1.2.8. Control system and software shall be designed so that after an emergency stop, the control system restarts at the same step where the operation was interrupted

### 1.9.1.3. System Software:

- 1.9.1.3.1. Operating system shall be Windows CE
- 1.9.1.3.2. Shall have visualization software
- 1.9.1.3.3. Programming language shall be Visual Basic
- 1.9.1.3.4. Data base shall be Microsoft SQL CE-Server

### 1.9.1.4. <u>User-Software:</u>

- 1.9.1.4.1. Software shall support material master data to be stored once in the technology memory allocated to specific material code
- 1.9.1.4.2. Material code shall have 24 digits and be alphanumerical & have maximum of 80 different material codes
- 1.9.1.4.3. Material data shall be able to be deleted, modified and supplemented at any time, also during operation

### 1.9.1.5. Storage Location Management:

- 1.9.1.5.1. The following data shall be allocated and displayed for each storage compartment:
- 1.9.1.5.2. Compartment number (row and compartment height)
- 1.9.1.5.3. Sub-compartment within the pallet /cassette (max. 80 divisions within a pallet /cassette)
- 1.9.1.5.4. Material code
- 1.9.1.5.5. Storage location blocked yes/no
- 1.9.1.5.6. Shall automatically display and activate upon entering an order using the material code, the appertaining compartment number
- 1.9.1.5.7. Shall automatically display material stored once entering the compartment number
- 1.9.1.5.8. Shall have capability to block access to certain shelf locations of materials which have not yet been released by the quality control department
- 1.9.1.5.9. In a separate window, the individual compartments as well as the sub-components of a shelf compartment shall be displayed with material code

### 1.9.1.6. Quick Start: Shall have capability of;

- 1.9.1.6.1. Selection of the requested pallet/cassette by means of clicking at the storage system overview
- 1.9.1.6.2. Overview of all compartments with articles and stocks (only at stock management) and empty compartments shown in Quick Start menu
- 1.9.1.6.3. Selection of compartment, working station and in- and out-storing by the operator
- 1.9.1.6.4. Booking of in- and out-storing quantity at station dialog
- 1.9.1.6.5. Order shall proceed immediately when all conditions meet the requirements, otherwise it shall be attached to the order list
- 1.9.1.6.6. Correct orders in memory as long as they are not already being processed
- 1.9.1.7. <u>User management</u>: Shall have five user groups with different authorization levels (administrator, service, shift supervisor, operators and trainee)

### 1.9.1.8. Diagnosis and service facilities:

1.9.1.8.1. Error messages shall be displayed in plain language

- 1.9.1.8.2. The status of the operating gantry crane shall be permanently displayed in plain language. Program steps shall be displayed stating the respective flag and its designation
- 1.9.1.8.3. Software changes shall be via USB interface
- 1.9.1.8.4. Set and actual values of the individual axes shall be displayed
- 1.9.1.8.5. Shall have graphical display of functions (sensors, actors)
- 1.9.1.8.6. Shall have overload protection of the operating crane. Overload shall be displayed by message
- 1.9.1.8.7. Shall display status of the computer interface (only at active interface)
- 1.9.1.8.8. Shall provide remote diagnosis service via telephone line (modem or internet)
- 1.9.1.9. Special voltage: Contactor shall provide any special voltage required
- 1.9.1.10. Extension of Temperature Range: Control cabinet shall be capable of accepting modifications necessary for extension of temperature range from +35 to +40 °C
- 1.9.1.11. Technical Objectives and Goals.
  - 1.9.1.11.1. Qty of 3 each Operation and Repair Manuals shall be provided by Contractor. The Repair Manuals shall include electrical and mechanical drawings and basic troubleshooting instructions. It should also include preventive maintenance procedures and an operator checklist.

### 2. Specific Requirements.

## 2.1. Sheet Metal Retrieval Component:

- 2.1.1. Approximate system dimensions shall be; Height 19.67ft (5995mm) x Length (without stations) 17.32ft (5280mm) x Width 18.89ft (5760mm)
- 2.1.2. Shall have 46 ea storage places to accommodate 46 ea pallets
- 2.1.3. Operating Gantry Crane: For safe operation and fast movement of metals.
  - 2.1.3.1. Speed shall be approximately 52.48ft/min (16.9 m/mm)
- 2.1.4. Pull and push device: For a reliable pallet transport.
  - 2.1.4.1. Speed shall be approximately 65.60ft/min (16.0m/min)
- 2.1.5. Shelf Block:
  - 2.1.5.1. Welded steel structure for storing pallets of sheet metal
- 2.1.6. Pallets:
  - 2.1.6.1. To hold sheet metal plates.
  - 2.1.6.2. 46 units required
  - 2.1.6.3. Pallet in self-supporting version shall be capable of retaining sheet metal plates up to format, I x w = 5 x 12ft. (1524 x 3660 mm), prepared for socket pins on both longitudinal (4 units each) and front sides (2 units each) of the pallet
  - 2.1.6.4. Loading height shall be approximately 3.94in. (100mm)
  - 2.1.6.5. Max load shall be at a minimum 6.613.80lbs (3.0t)
- 2.1.7. Socket Pins: Visual contour control and loading aid for the operator.
  - 2.1.7.1. 46 sets required
- 2.1.8. <u>Longitudinal Station- Carriage</u>: Pallet storage component for adding pallets to storage and removing pallets from storage.

- 2.1.8.1. Shall have pallet fixings in longitudinal and transverse direction
- 2.1.8.2. Travel drive shall be via gear motor via synchronous shaft and runners and be stepless, frequency-controlled 0-98.40ft/min (0-30 m/mm)
- 2.1.8.3. Shall have approximate dimensions 49.20 ft. (15m) travel guides (embedded into the floor)
- 2.1.8.4. Pallet shall have exact positioning in the shelf block
- 2.1.8.5. Proportional safety devices to be contained in this position
- 2.1.9. Storage Location Management:
  - 2.1.9.1. The following data shall be allocated and displayed for each storage compartment:
  - 2.1.9.2. Type of pallet high/low
  - 2.1.9.3. Pallet stored/removed
- 2.1.10. Extra Control Unit:
  - 2.1.10.1. Hardware execution shall be same as on central control system
  - 2.1.10.2. Shall have program input and visualizing over 10" touch TFT color display
  - 2.1.10.3. Shall have same dialogue as central control station

### 2.2. Bar Stock Retrieval Component:

- 2.2.1. Approximate system dimensions shall be; Height 19.62ft (5980mm) x Length (without stations) 25.36ft (7730mm) x Width 10.10ft (3080mm)
- 2.2.2. Shall have 32 ea storage places to accommodate 32 ea cassettes
- 2.2.3. Operating Gantry Crane: For safe operation and fast movement of metals.
  - 2.2.3.1. Speed shall be approximately 39.36ft/min (12.0 m/mm)
- 2.2.4. Pull and push device: For a reliable cassette transport.
  - 2.2.4.1. Speed shall be approximately 65.60ft/min (16.0m/min)
- 2.2.5. <u>Cassettes</u>: To hold bar stock. Approximate dimensions of internal capacity shall be as follows; Length 21.33ft (6,500mm) x width 2.23ft (680mm). See loading height required for each type of cassette required.
  - 2.2.5.1. Type 1: Loading height shall be 6.10in (155mm). 28 units required.
  - 2.2.5.2. Type 2: Loading height shall be 9.45in (240mm). 4 units required.
  - 2.2.5.3. Type 3: Loading height shall be 1.46ft (444mm). 2 units required.
  - 2.2.5.4. Cassettes in self-supporting version shall be suitable for roller tracks
  - 2.2.5.5. Cassettes shall be stackable to a limited extent
  - 2.2.5.6. Cassettes shall be transportable by crane via a transport traverse
  - 2.2.5.7. Cassettes shall be closed at the front on one side and on the opposite end they are prepared for a guiding sheet
  - 2.2.5.8. Side walls of cassettes shall be closed by means of a canted solid plate construction for smooth transportation
  - 2.2.5.9. Cassettes shall be reinforced by bars on the floor and lateral posts spaced longitudinally by approx. 3.02ft.(920mm)

- 2.2.5.10. Static dimensioning shall be based on material of easy bending properties, e.g. very thin flat material. Heavy bars up to the maximum permissible weight shall be evenly distributed on all floor bars
- 2.2.5.11. Max load shall be at a minimum 3,306.90 (1.5t)
- 2.2.6. <u>Lateral Station Cassette conveyor</u>: For adding cassettes to storage and removing cassettes from storage.
  - 2.2.6.1. Shall have cassette fixings in longitudinal and transverse direction
  - 2.2.6.2. Travel drive shall be via gear motor via synchronous shaft and runners and be stepless, frequency-controlled 0-98.40ft/min (0-30 m/mm)
  - 2.2.6.3. Shall have approximate dimensions 49.20 ft. (15m) travel guides (embedded into the floor)
  - 2.2.6.4. Cassettes shall have exact positioning in the shelf block
  - 2.2.6.5. Proportional safety devices to be contained in this position
- 2.2.7. Storage Location Management:
  - 2.2.7.1. The following data shall be allocated and displayed for each storage compartment:
  - 2.2.7.2. Type of cassette high/low
  - 2.2.7.3. Cassette stored/removed
- 2.2.8. Extended Warranty: Three additional years.

# 3. Additional Requirements.

- 3.1. Contractor shall provide shipping of Automated Shelving Unit System from his facility to Maintenance Center Barstow. Contractor shall provide all equipment and personnel necessary to unload, install and test operational functions and training. Automated Shelving System shall be shipped as a completely pre-assembled and factory-tested system.
- 3.2. A full two year warranty shall be in effect the day initial dynamic operational tests are done and verified as successful by MCB. The warranty shall cover all parts, materials and labor at no additional cost to the Government.
- 3.3. Extended warranty service shall be available at purchase time for a minimum of three (3) additional years.
- 3.4. Contractor shall be required to perform repairs on the Automated Shelving Unit System during Warranty Period. In the event that the Contractor does not have the resources or capabilities to perform repairs then contractor shall provide the government with a factory authorized service repair source at no additional cost to the Government.
- 3.5. Contractor shall provide three days of on-site training for four artisans to include Theory of Operation/Trouble shooting, Preventive Maintenance, Maintenance and Operator Training. Contact Rick Clare at 760 985-4052 to set up time for training and base access.

### 3.6. Contractor Services.

- 3.6.1. Contractor shall respond within 48 hours when a government representative notifies the contractor of equipment failure. Due to Maintenance Center Barstow's mission to support the Marine Corps and other uniformed services, it is imperative to reduce equipment downtime which is a tandem to work stoppages. Therefore, it is imperative to the Contractor to respond rapidly to repair calls.
- 3.6.2. A full two year warranty shall be in effect the day initial dynamic operational tests are done and verified as successful by MCB. The warranty shall cover all parts, materials and labor at no additional cost to the Government. Extended warranty service shall be available at purchase time for a minimum of three (3) additional years.

## 4. Applicable Documents.

- 4.1. <u>Department of Defense specifications</u>.
  - 4.1.1. A. ASTM D: Standard Practice for Commercial Packaging
- 4.2. <u>Department of Defense standards</u>.
  - 4.2.1. MIL-STD-461: Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
  - 4.2.2. MIL-M-18058: Machinery, Metal and Woodworking, Packaging of
- 4.3. Other Government documents.
  - 4.3.1. FED-STD-376: Preferred Metric Units for General Use by the Federal Government
- 4.4. <u>Industry documents</u>.
  - 4.4.1. ANSI/NEMA ICS 1: General Standards for Industrial Machinery
  - 4.4.2. NFPA 79: Electrical Standard for Industrial Machinery
  - 4.4.3. UL 508A: Industrial Control Equipment
  - 4.4.4. ASME B30.13: Storage Retrieval (S/R) Machines and Associated Equipment
  - 4.4.5. ASME B30.2: Overhead and Gantry Cranes (Top Running Bridge, Single Girder, or Multiple Girder, Top Running Trolley Hoist)
  - 4.4.6. ASME NOG 1: Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)
  - 4.4.7. DIN 15350: Operating Gantry Cranes
  - 4.4.8. EN 10025: Hot Rolled Products made of Unalloyed Construction Steel
  - 4.4.9. EN 528: Operating Gantry Crane Safety
  - 4.4.10. DIN EN ISO 12100: Safety of Machines (part 1 + 2)
  - 4.4.11. EN 294: Safety Distance From Reaching the Hazardous Areas with the Upper Extremities
  - 4.4.12. EN 349: Safety of Machines, Avoidance of Getting Pinched
  - 4.4.13. DIN EN 18800: T 1-7: Steel Constructions
  - 4.4.14. DIN 18808: Steel Constructions; Supporting Framework made of Hollow Sections under Predominantly Permanent Load
  - 4.4.15. DIN 4132: Gantry Tracks, Steel Supporting Frameworks
  - 4.4.16. EN 60204-1: Electrical Equipment of Machines
  - 4.4.17. EN 60439-1: Switchgear Combinations
  - 4.4.18. EN 954-1: Safety Relevant Parts of Control systems